paragraph, as indefinite. More specifically, Examiner objects to "the value" at line 8 of claim 4 and "the cross-sectional" in line 4 of claim 5 as lacking sufficient antecedent basis.

This basis for rejection is traversed, for the following reasons. A resistance heater must necessarily have some resistance, and the measure applied to such a resistance is termed the "value." The word "value" is defined by a conventional dictionary as "5. *Math.* **a.** magnitude; quantity; number represented by a figure, symbol or the like. *The value of* x_2 *at 2 is 4.*" Thus, a given parameter necessarily has a value. As pointed out by Becker at page 6-19 in his tome *Patent Applications Handbook*, Clark Boardman Callaghan, 1992, the indefinite article need not be used when the element referred to must necessarily exist. Becker gives as an example the newly-mentioned "center" of a previously recited "circle," which center is necessarily defined by the circle, so a recitation of "the center of said circle" is proper without further antecedent. Similarly, since the resistance heater must have a value of resistance, the definite article "the" is proper as applied to that value.

As to "the cross-sectional," it is hard to imagine a "path for the flow of fluid" which would not have a cross-sectional area, for a "path" suggests some restraint, such as walls, against flows in or to regions not within the definition of the path in question. The restraint, in turn, suggests a cross-sectional area bounded by those restraints or walls. In the case of a liquid flowing in an open channel, the upper bound would be the liquid surface when in a gravity environment, and in the case of a gas or a plasma, or a liquid in a low-gravity environment, the upper bound would be a further wall of some sort, otherwise the gas or plasma (or liquid) would be unbounded and therefore not limited to the "path." Thus, it is believed to be demonstrable that the recited "path" necessarily defines a cross-sectional area. Assuming that this is so, the recitation of a "cross-sectional area" of the path is proper, without a previous positive recitation of such an area. Withdrawal of this basis for rejection is requested.

Examiner also objects to "the form" in line 5 of claim 5. A recitation of a quantity with its dimensions appears to have a "form", namely "mass quantity per unit time" or "volume per unit time". Any of a number of dictionary definitions of

"form" appear to apply to this particular use, as for example "6. a particular condition, character, or mode in which something appears; *water in the form of ice*," "11 *Philos.* a. the structure, pattern, organization, or essential nature of anything **b**. structure or pattern as distinguished from matter." It does not seem possible to recite dimensions without some recital having a form. The inherency exists on its face, and there is no basis for objection.

4. Examiner rejects claims 1-4, 6, 7, and 12 under 35 U.S.C. § 102(b) as anticipated by Alvesteffer et al. '695. The invention recited in independent claim 1 clearly distinguishes over Alvesteffer et al. More particularly, claim 1 recites

> " signal processing means located within said body, and coupled to said control means, to said temperature determining means, and to said pressure sensing means, for processing said flow signal, said temperature signal, and said pressure signal, for generating digital signals representing said flow, said temperature, and said pressure, for transmission over a digital signal transmission path; and
>
> signal connection means mounted on said body, and connected to at least said signal processing means, for providing a standard connection between said signal processing means and said signal transmission path."

and it is clear that Alvesteffer et al. does not produce "digital signals representing fluid flow, temperature, and pressure, for transmission over a digital signal transmission path", and also fails to show, describe, or even suggest a "signal connection means mounted on said body, for providing a standard connection between said signal processing means and said signal transmission path." Consequently, there is no anticipation as to claims 1-4, 6, and 7.

Claim 12 recites inter alia matter substantially identical to that quoted above from claim 1, and overcomes the anticipation rejection for the same reasons.

Thus, claims 1-4, 6, 7, and 12 are patentable.

5. Claims 5 and 8-11 are rejected under 35 U.S.C. § 103(a) as unpatentable over Alvesteffer et al. in view of Redford and Azima. This basis for

rejection is traversed because the rejected claims 5 and 8-11 depend from parent claims which are themselves patentable as described above, and are patentable for that reason alone.

This basis for rejection of claims 5 and 8-11 is also traversed because there is no proper nexus for Examiner's suggested combination of references, and because the references, even if combined as suggested by Examiner notwithstanding the lack of a proper nexus therefor, do not in such combination make out the claimed invention.

More particularly, Examiner states that Alvesteffer et al. teach all aspects of the claimed invention **"except"** various elements. Among these elements are (a) the control means comprising a memory preprogrammed with a value corresponding to the cross-sectional area of the path, (b) the flow determination being in the form of one of mass quantity per unit time and volume per unit time, (c) the signal processor being integrated into a single unit, (d) the pressure sensor being of the ratiometric type, (e) a controllable valve having a controllable flow channel connected by a further fluid path to the flow path of the integrated sensor, (f) the controllable valve being within the body, and (g) a control processor being at a location remote from the body of the integrated sensor. Examiner then goes on to state that (a) the programming of the memory would have been obvious "in order to determine the mass flow rate in any structural body," (b) the integration of the processor and the controller would have been obvious "to provide the most efficient and accurate output." Nowhere, however, do Alvesteffer et al. state that it is necessary to go to some other reference for the purpose of achieving the most efficient and accurate output. In the absence of such a suggestion in Alvesteffer et al., there is no proper nexus for seeking out and combining with other references, and Examiner's suggested combination of elements is without proper nexus. In the absence of such a proper nexus, the suggested combination cannot be made, and without the suggested combination, the §103 rejection fails. Claims 5 and 8-11 are patentable for this reason alone.

As to claim 5, Examiner states at page 6 of the Office Action

> "The preprogrammed memory [presumably of claim 5] is just that, preprogrammed by someone or something. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have preprogrammed the memory to provide the cross-sectional area of the path in order to determine the mass flow rate in any structural body."

which does not at all relate to the additional references associated with the §103 rejection, but rather is a bald statement of obviousness. Such a statement is not a credible basis for rejection of claim 5. Thus, claim 5 is patentable over Examiner's suggested combination of Alvesteffer et al., Redford et al., and Azima.

Claim 8 recites

> "An integrated sensor according to claim 1, wherein said control means and said signal processing means are integrated into a single unit."

Examiner states with regard to this claim "As taught by Alvesteffer et al, it appears that the control means and the signal processor are integrated into a single unit as shown in fig. 5." However, this does not make the claimed invention obvious, because it is "said control means and signal processing means" which are recited as being integrated, and the "said signal processing means" is that one recited in claim 1. The claim 1 signal processing means is "for processing said flow signal, said temperature signal, and said pressure signal, for generating digital signals representing said flow, said temperature, and said pressure, . . .;" There is no such processing means in Alvesteffer et al., and the addition thereto of Redford et al. andor Azima does not create such a processing means. Thus, claim 8 is patentable as reciting integration of a control means and a processing means which do not exist in the prior art. Claim 8 is therefore patentable over Examiner's suggested combination of Alvesteffer et al. with Redford et al. and Azima.

Claim 9 depends from claim 1, and is patentable for that reason alone.

Examiner asserts at the bottom of page 6 of the Office Action that it would have been obvious to a person of ordinary skill in the art to have placed the valve of Azima in the flow sensor of Alvesteffer et al. in order to provide control of

the flow. This argument presumably applies to claim 11. Even assuming that this is true, however, claim 11 is not thereby rendered obvious, because claim 11 recites more than simply such integration. More particularly, claim 11 recites inter alia

> "a control processor at a location remote from said body of said integrated sensor, and coupled thereto by way of said transmission path, for correlating valve state with fluid flow for one of (a) verifying operation of an element of said integrated sensor and (b) verifying the integrity of fluid paths to which said integrated sensor is connected."

which is nowhere shown in any one of Alvesteffer et al., Redford et al., or Azima. That which is absent in each and every one of the references combined according to Examiner's suggestion cannot be within their combination. Thus, the invention recited in claim 11 is different from the result of Examiner's suggested combination of references, even if such combination is made in the absence of a proper nexus therefor. Thus, claim 11 is patentable in a §103 sense over Examiner's suggested combination of references.

6. Thus, claims 1-12 are patentable, and should be allowed. Reconsideration and allowance of claims 1-12 are requested.

7. An appendix is attached which sets forth the claims in their current state.

8. The number of claims being unaffected by the amendment, no fee is believed to be due. Please charge any additional fees to Deposit Account 07-0882.

Respectfully submitted,

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APPENDIX

1. An integrated fluid flow, temperature and pressure sensor, said sensor comprising:

a body including a path for the flow of fluid:

temperature determining means located within said body, and coupled to said path, for making a determination of the upstream temperature of a fluid flowing in said path:

heating means located within said body, and coupled to said path, for transferring heat from said heating means to said fluid;

control means located within said body, and coupled to said heating means and to said temperature determining means, for applying power to said heating means in an amount required to raise the temperature of said heating means above said upstream temperature by a predetermined amount, and for converting the value of said power into a flow signal representing a corresponding flow;

pressure sensing means located within said body, for sensing fluid pressure in said path at a location adjacent to one of said heating means and said temperature determining means, for generating an electrical signal representative of the pressure of said fluid;

signal processing means located within said body, and coupled to said control means, to said temperature determining means, and to said pressure sensing means, for processing said flow signal, said temperature signal, and said pressure signal, for generating digital signals representing said flow, said temperature, and said pressure, for transmission over a digital signal transmission path; and

signal connection means mounted on said body, and connected to at least said signal processing means, for providing a standard connection between said signal processing means and said signal transmission path.

2. A sensor according to claim 1, wherein said pressure sensing means located within said body, generates an analog electrical signal representative of the pressure of said fluid.

3. An integrated sensor according to claim 1, wherein said control means comprises a second temperature determining means coupled to said heating means, for determining the temperature of said heating means.

4. An integrated sensor according to claim 3, wherein said second temperature determining means is an electrical resistor, and said second temperature determining means comprises means coupled to said heating means for measuring the electrical resistance of said heating means, and said control means comprises means for converting the value of said resistance into a corresponding temperature.

5. An integrated sensor according to claim 1, wherein said control means comprises a memory preprogrammed with a value corresponding to the cross-sectional area of said path, and said flow determination is in the form of one of mass quantity per unit time and volume per unit time.

6. An integrated sensor according to claim 1, wherein said path is associated with a peripheral wall, and wherein said heating means is in the form of a peripheral structure surrounding said peripheral wall, and in thermal contact therewith.

7. An integrated sensor according to claim 6, wherein said peripheral wall is made from conventional materials having a thickness commensurate with the pressure and temperature of said fluid, except in a region near that in which said heating means is thermally coupled, in which region said peripheral wall is made from a material having higher strength than said conventional materials, of a thickness less than said commensurate thickness.

8. An integrated sensor according to claim 1, wherein said control means and said signal processing means are integrated into a single unit.

9. An integrated sensor according to claim 1, wherein said pressure sensing means is a ratiometric pressure sensor.

10. An integrated sensor according to claim 1, wherein said pressure sensor is a microelectromechanical system device.

11. An integrated sensor according to claim 1, further comprising

a controllable valve having a controllable flow channel connected by a further fluid path to said flow path of said integrated sensor, said controllable valve being within said body; and

a control processor at a location remote from said body of said integrated sensor, and coupled thereto by way of said transmission path, for correlating valve state with fluid flow for one of (a) verifying operation of an element of said integrated sensor and (b) verifying the integrity of fluid paths to which said integrated sensor is connected.

12. An integrated fluid flow, temperature and pressure sensor, said sensor comprising:

a body including a path for the flow of fluid in a region:

a temperature sensor located within said body, and coupled to said path, for making a determination of the upstream temperature of a fluid flowing in said path:

a heater located within said body, and thermally coupled to said path, for transferring heat from said heater to said fluid;

a controller located within said body, and coupled to said heater and to said temperature sensor, for applying power to said heater in an amount required to raise the temperature of said heater above said upstream temperature by a predetermined amount, and for converting the value of said power into a flow signal representing a corresponding flow;

a pressure sensor located within said body, for sensing fluid pressure in said path, for generating an electrical signal representative of the pressure of said fluid;

a signal processor located within said body, and coupled to said controller, to said temperature sensor, and to said pressure sensor, for processing (a) said flow signal, (b) said temperature signal, and (c) said signal representative of the pressure, for generating digital signals representing said flow, said temperature, and said pressure, for transmission over a digital signal transmission path; and

a signal connector mounted on said body, and connected to at least said signal processor, for providing a standard connection between said signal processor and said signal transmission path.